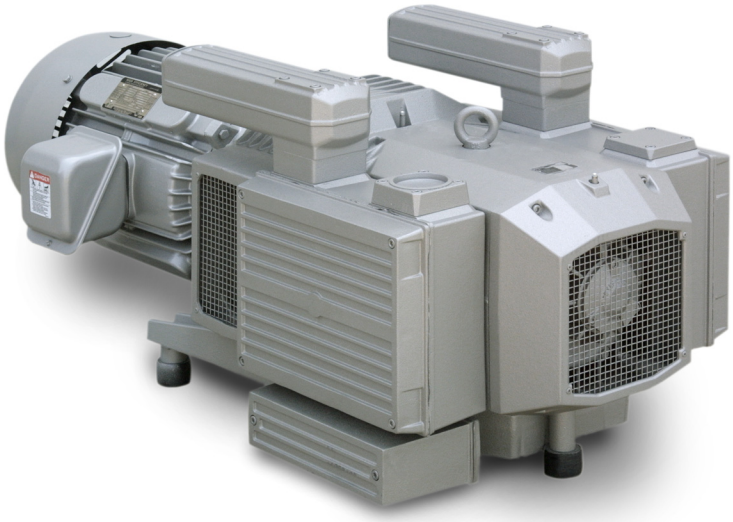
BECKER
Repair and Service Manual
VTLF, DTLF, DVTLF Series



This manual covers repairs and service for the following Becker models:
VTLF200, VTLF 250, DTLF 250, DVTLF 250, VTLF400, VTLF 500, and DTLF 500

This manual is to be used in conjunction with the current parts list for the appropriate model. Reference numbers used in this manual are position numbers as shown on the parts list. The sealing compounds and greases referred to in this manual are those recommended by the pump manufacturer. These are available through your Becker Pumps representative.

DISASSEMBLY

1. Remove 4 nuts (#197) from the motor flange (#187) and remove the motor and flange.

2. Remove the shaft end screw from the rotor shaft (#77).

3. Remove the coupling with fan (#69).

4. Remove the key (#10).

5. Loosen and remove the 4 inside hex head screws (#67) with spring washers from connection flange (#61).

6. Remove the filter covers (#120 & #95) and remove the filter cartridge(s) (#118).

7. Remove filter housings (#101 & #81).

8. Remove the protective hood (#41).

9. Remove grease conduits (#35) from both endshields.

10. Roll pump onto side so that the discharge port is facing downward.

11. Remove SK filter housing (#513).

12. Remove ring screw (#58).

13. Place housing horizontally on workbench so that the hole for the ring bolt (#58) is on the bottom.

14. Unscrew the 8 hex head screws (#16) and using two of the screws in the two threaded holes in the endshield, press off the right side shield (#11).

15. Carefully remove the vanes (#7).

16. Loosen the 8 hex head screws (#16) from let side shield and remove the side shield and rotor from the housing.

17. Install shaft end bolt (#77) in end of rotor to protect threads and using large puller, pull A-side endshield off rotor.

18. The unit is now completely disassembled. Thoroughly clean the unit in a solvent discarding gaskets, filters, and dust separator. After cleaning in solvent, degrease rotor, end shields, and cylinder with contact cleaner and blow dry with compressed air.

INSPECTION

1. Inspect cylinder for chatter marks or scoring.
2. Inspect side shields. If heavily scored, replace.
   Note: Anytime a major component (end shield, rotor, or cylinder housing) is replaced, the rotor to cylinder clearance must be reset.
3. Inspect rotor for damage.

REASSEMBLY

1. **Replacement of A side bearing TLF 200/250**
   - Remove the 3 internal hex head screws from bearing cap and remove cap (#13).
   - Remove bearing, shaft seal, and teflon tube seals (#25, 32, & 33).
   - Fill new bearing with Amblygon TA 15/2 grease.
   - Install new shaft seal and teflon tube seals.
   - Place bearing in seat in endshield and replace bearing cap; be sure to evenly tighten screws.

1A. **Replacement of A side bearing and setting rotor to endshield clearance TLF 400/500**
   - Remove 4 internal hex had screws from bearing cap and remove cap (#13).
   - Remove bearings, shaft seal, teflon tube seals, and removable bearing housing (#25, 32, & 33).
   - Remove inner bearing race from rotor shaft.
   - Fill new bearings with Amblygon TA 15/2 grease.
   - Install new shaft seal and teflon tube seals.
   - Place inner bearing race (bearing NU2211 #906614) onto rotor shaft.
   - Place the remaining part of bearing (NU2211 #906614) into A side endshield.
   - Place spring washer on top of outer bearing race.
   - Install removable bearing housing into endshield.
   - Place second bearing in removable bearing housing without O-ring.
   - Check that bearing has 0 endplay (side clearance) in housing with bearing cap installed; add shims until there is no endplay.
   - Remove bearing and install O-ring; coat O-ring with grease to help bearing slide into housing.
   - Reinstall bearing cap (#13).
   - Place selection of shims (#27, 28, & 29) on rotor and press endshield onto rotor.
   - Measure clearance between rotor and endshield.
   - Add or subtract shims to obtain proper clearance as listed in Table 2.
   - Place selection of shims (#27, 28 & 29) on rotor and press endshield onto rotor.
   - Measure clearance between rotor and endshield.
   - Add or subtract shims to obtain proper clearance as listed in Table 2.

2. **Replacement of B side bearing**
   - Remove the 3 internal hex head screws from bearing cap and remove cap (#15 & 14).
   - Remove bearing outer race with rollers and cage, shaft seal, and teflon tube seals (#24, 32 & 33).
   - Install new shaft seal and teflon tube seals.
   - Fill new roller bearing half full with Amblygon grease and place in bearing seat in end shield.
   - Replace bearing cap and be sure to evenly tighten internal hex head screws.
   - Remove shaft end screw and grease ring (#22 & 21).

SETTING ROTOR TO A SIDE ENDSHIELD CLEARANCE TLF 200/250

1. With new bearings and shaft seals in A side endshield, place shim stack of 0.15mm to 0.20mm on A side of rotor shaft. Press endshield onto shaft and measure clearance between endshield and rotor. See Table 2 for proper clearances. Add or subtract shims to obtain proper clearance.

The following steps are only required if a major component of the pump has been replaced (endshield, rotor, or pump housing).

Setting Rotor to Cylinder Clearance

TLF 200/250 only .... the following procedure is not needed on TLF 400/500.

1. Place housing on work bench so that the minimum clearance area (the area of minimum rotor to cylinder clearance when the pump is fully assembled) is positioned at the bottom.

2. Remove locating pegs (#17) from both endshields. Mark endshields for suitable location of new holes for locating pegs.

3. Set rotor to endshield clearance using new bearings and shaft seals.

4. Insert gauge tape (feeler gauge, shim stock, paper or non-reinforced tape) of proper thickness, and approximately the same width as a rotor segment (area between two vane slots) into the cylinder. Make sure the rotor is supported by a single thickness of gauge tape above the cylinder.
5. Place rotor and A side endshield into housing making sure that rotor segment, not a vane slot, is resting on the gauge tape.

6. Install A side endshield bolts, but do not fully tighten.

7. Install B side endshield bolts, but do not fully tighten.

8. Using moderate pressure, press down on endshield and center endshield bolts in holes.

9. On 4.5mm drill bit, mark drilling depth using peg as guide.

10. Drill holes in endshield to proper depth, taking care to keep drill perpendicular to endshield.

11. Repeat on opposite end.

12. Remove endshields and redrill holes in body with 4.9mm drill bit.

13. Using 5mm H7 reamer, ream holes in endshields.

14. Ream holes in body using 5mm carbide reamer.

15. Install locating pegs in endshields and remove gauge tape from rotor and cylinder.

16. Reinstall A side endshield and rotor.

17. Install vanes and B side endshield.

18. Rotor to cylinder clearance is now reset; continue reassembling unit in normal manner.

REASSEMBLY CONTINUED

1. Place housing on work bench so that area of minimum clearance is on the bottom (the area of minimum clearance when pump is fully assembled) and inlet port is on the left.

2. With housing positioned as described above, slide rotor and A-side endshield assembly into housing, making sure that inlet port is on the left when housing is viewed from the A-side endshield.

3. Install vanes and B-side endshield. Install endshields bolts in both endshields and fully tighten.

4. Roll pump assembly onto exhaust port side and install inlet filter housing (#101) with new gasket.

5. Install new inlet filter (#118) and filter cover (#120) with new gasket.

6. Install SK filter housing (#512) with new gasket. Replace SK filters (#507) and cover gasket (#511).

7. Install grease conduits (#35) on both endshields.

8. Install connection flange (#61) and roll pump assembly onto feet.

9. Install discharge filter housing (#81) with new gasket. Install dust separator if unit is equipped with and discharge filter cover (#95).

10. Replace protective hood (#41).

11. Replace shaft key (#10) and fan with coupling (#69). Tighten shaft end bolt (#77).

12. Check motor coupling distance.

13. Reinstall motor.

Setting Motor Coupling Distance

1. Place straight edge across the machined surface of the motor connection flange (#61) and measure to the outer ring of the pump coupling.

2. Subtract 2mm (.080") from measurement obtained in step 1.

3. Place straight edge across motor coupling (#164) and push coupling on to motor shaft far enough to obtain the distance calculated in step 2 from outer ring of coupling to mating surface of motor connection flange (#61).

4. Apply blue lock tite (*Lock Tite #242*) to motor coupling set screw (#170) and tighten.

5. Attach motor to pump.

Unit Testing

1. Check that motor is wired for correct voltage and frequency. Check motor for correct direction of rotation.

2. Operate pump under no load for approximately 20 minutes.

3. Place vacuum gauge or gate valve on inlet port (on combined units also install pressure gauge on discharge port). Adjust pump relief valve(s) so that pump cannot exceed rated vacuum or pressure. Check motor amperage. As unit warms up, amps will go down and vacuum and pressure may go up, so it may be necessary to reset valves.

4. When everything is operating properly, continue to test unit for 60 minutes.

TROUBLE SHOOTING

Problem	Possible Cause	Solution
Unit lacks sufficient vacuum or compressed air.	Clogged filters.	Clean or change filters; add a higher capacity external filter in series with the existing internal filters
	Stuck rotor vanes.	Disassemble unit and clean all oil traces from internal parts. Replace carbon vanes, since they become hygroscopic when exposed to oil. Check for oil contamination in the suction line.
	Pressure or vacuum relief valves need adjusting.	Recalibrate valves.
	Leaks or restrictions in piping.	Open pipe connections and examine for internal contamination or build-up. Tighten all piping connections. Replace rubber hoses.
	Insufficient pump speed (RPM).	Check voltage and amperage to motor. Inspect motor coupling halves. Check that the pump shaft turns freely. Clean and open all ports.
	Clogged ports.	Inspect gaskets for breakage or disintegration. Replace if necessary.
	Defective gaskets.	Replace gaskets.

Problem	Possible Cause	Solution
Unit lacks sufficient vacuum or compressed air (contd.).	Line losses too high.	Piping diameter too small - replace with large diameter. Check for clogged filter elements - replace if necessary.
	Carbon dust separator clogged.	Inspect, clean, or replace.
	Unit is operating at an elevated altitude.	Contact the factory for assistance. Performance may be reduced when operating above sea level.
Motor breakers trip constantly.	Defective motor.	Test motor and replace if necessary.
	Undersized circuit breaker.	Replace with correctly sized breaker.
	Heaters too small.	Replace with correctly sized heaters.
	Low motor voltage.	Check at motor terminals. Contact electric service provider.
	Ambient temperature too high.	Reduce ambient temperature to below 104$^{\mu}$F.
	Stuck rotor.	Disassemble pump to determine reason. Replace all necessary parts.
	Clogged carbon dust separator - back pressure too high.	Clean or replace dust separator.
Unit runs rough, cannot be rotated manually.	Broken rotor vane.	Disassemble unit and replace vane. Check cylinder for wear.
	Worn coupling disc.	Remove motor and inspect rubber coupling disc and pins. Replace, if necessary, and realign.
	Seized bearings.	Remove endshields and inspect bearings. Replace if necessary. Reshim bearings to maintain proper clearance.

Problem	Possible Cause	Solution
Unit runs rough and cannot be rotated manually (contd.).	Oil in cylinder.	Remove endshields and inspect cylinder. Clean oil and replace vanes. Clean unit thoroughly. Inspect piping; determine source of oil and eliminate.
	Locked rotor.	Remove endshields and inspect cylinder. Remove contamination.
Pump overheats.	Cooling ducts blocked.	Clean cooling ducts.
	Cooling fan broken.	Replace fan.

REPAIR TOLERANCES

Table 1

Pump Type	Rotor Length	Cylinder Length	Cylinder Inside Diameter
VTLF 250	**354.29 - 354.26**	**354.964 - 355.00**	**175.00 - 175.04**
VTLF 500	**439.00 - 439.02**	**439.96 - 440.00**	**230.00 - 230.046**

Table 2

Pump Type	Vane Length	Vane Width	Rotor to End Shield (C)	Rotor to Cylinder (D)
		Min. New		
VTLF 250	**354.35 - 354.30**	**41.0 - 65.0**	**0.07 - 0.10**	**0.14 - 0.16**
VTLF 500	**219.55 - 219.525**	**53.0 - 88.0**	**0.15 - 0.20**	**0.20 - 0.25**

Note: All dimensions are in Millimeters.